

- 1 1. A optical amplification method comprising the steps of:
  - 2 receiving an optical signal for amplification;
  - 3 selecting, a pre-programmed filter from a plurality of such filters;
  - 4 applying, the selected filter to the received signal; and
  - 5 amplifying the filtered signal.
- 1 2. The amplification method according to claim 1 further comprising the step of:
  - 2 collecting control system input sufficient to select filtering characteristics.
- 1 3. The amplification method according to claim 1 wherein the pre-programmed
  - 2 filter is one of a set of predetermined filter profiles wherein each one of the set has
  - 3 an arbitrary shape.
- 1 4. A optical amplification method comprising the steps of:
  - 2 receiving an optical signal for amplification;
  - 3 amplifying the received signal;
  - 4 selecting, a pre-programmed filter from a plurality of such filters; and
  - 5 applying the amplified signal to the selected filter.
- 1 5. The amplification method according to claim 5 further comprising the step of:
  - 2 amplifying the filtered signal.
- 1 6. The amplification method according to claim 5 further comprising the step of:
  - 2 collecting control system input sufficient to select filtering characteristics.
- 1 7. The amplification method according to claim 5 wherein the pre-programmed
  - 2 filter is one of a set of predetermined filter profiles wherein each one of the set is
  - 3 an arbitrary shape.

1 8. A method of controlling/maintaining gain in an optical amplifier comprising the  
2 steps of:

3 collecting, control system input pertaining to a received optical signal,  
4 sufficient to select a pre-programmed filter from a plurality of such filters;

5 selecting, the pre-programmed filter; and

6 applying the signal to the filter;

7 such that the gain of the optical amplifier substantially achieves a desired  
8 profile as a function of optical signal wavelength.

1 9. The method according to claim 8 wherein the selected filter is an arbitrary, pre-  
2 determined one wherein the pre-programmed filter is one of a set of  
3 predetermined filter profiles wherein each one of the set has an arbitrary shape..

1 10. The method according to claim 9 further comprising the step of:

2 adjusting dynamically the spectral tilt of the gain profile of optical amplifier.

1 11. The method according to claim 10 wherein the dynamic adjusting is performed  
2 as a function of channel loading.

1 12. The method according to claim 11 wherein the dynamic adjusting is performed  
2 as function of input power to the amplifier.

1 13. The method according to claim 8 in which the control system information  
2 pertaining to the optical signal includes a measure of the gain at one or more  
3 erbium stages of the amplifier.

1 14. The method according to claim 8 further comprising the step of:

2 blocking of one or more wavelengths by the optical amplifier as a function of  
3 the input to the control system.

1 15. An optical filter comprising:  
2 a pre-programmed fixed optical spatial filter;  
3 an optical system for dispersing an input spectrum on to said filter wherein  
4 said optical system includes:  
5 a lateral position control system for controlling the lateral position of the  
6 dispersed spectrum on the pre-programmed fixed optical spatial filter  
7 positioned at the demultiplexed spectral plane; and  
8 an optical system for collecting the dispersed, filtered spectrum and  
9 directing it as an output spectrum.

1 16. The optical filter according to claim 15 wherein said pre-programmed fixed  
2 optical spatial filter is a 2-D optical phase filter.

1 17. The optical filter according to claim 15 wherein said pre-programmed fixed  
2 optical spatial filter is an amplitude filter.

1 18. The optical filter according to claim 15 wherein said pre-programmed fixed  
2 optical spatial filter is a reflection filter.

1 19. The optical filter according to claim 15 wherein said lateral position control  
2 system includes a tilting reflective surface to control the lateral position of the  
3 dispersed spectrum.

1 20. The optical filter according to claim 15 wherein said lateral position control  
2 system includes a transmissive linear phase controller to control the lateral  
3 position of the dispersed spectrum.

1 21. The optical filter according to claim 15 including an input fiber lateral shifter for  
2 controlling the position of the dispersed spectrum.

1 22. The optical filter according to claim 15 including a filter shifter for controlling  
2 the position of the dispersed spectrum.

1 23. The optical filter according to claim 15 further comprising a detector for  
2 detecting the position of the dispersed spectrum on the optical filter.

1 24. An optical amplifier comprising:  
2 means for receiving an optical signal;  
3 means for selecting a pre-programmed filter from a plurality of such filters;  
4 means for applying the selected filter to the optical signal; and  
5 means for amplifying the optical signal.

1 25. The optical amplifier according to claim 24 further comprising:  
2 means for collecting control system information sufficient to select the pre-  
3 programmed filter.

1 26. The optical filter according to claim 25 wherein the pre-programmed filter is  
2 one of a set of predetermined filter profiles wherein each one of the set has an  
3 arbitrary shape.

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